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Improvements in the Process of Fermentation and in the Manufacture of Alcohol, Beer, Wine, and the like.

COMPLETE SPECIFICATION.

I Sohan Henri Loder of 22 Tolsteegcingel, Utrecht in the Kingdom of the Netherlands do hereby declare the nature of my Invention for "IMPROVEMENTS IN THE PROCESS OF FERMENTATION AND IN THE MANUFACTURE OF ALCOHOL BEER WINE AND THE LIKE," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to preparing an alcoholic solution of colouring matters from phloroglucine, catechine, resorcine, orcine, phenole and benzole combinations, by mixing them with a mash, boiling them and finally setting them in fermentation.

Instead of phloroglucine and catechine, substances may be used, which, by being treated with acids or alkalies, give phloroglucine and catechine. It is to be understood that these matters have to be operated upon by acids, before they can be used in this process, to replace the glucosides, contained in the above mentioned substances. Moritannic acid or quercetine are the best substances to be used for this purpose. Resorcine is partly used as resorcine and partly as Trinitroresorcine. As an orcein compound I use archil.—Aniline, mononitrophenole, monoamidophenole are the benzole compounds to be considered in this process. Nitric acid, potassium nitrate or ammonium nitrate, potassium sulpho-cyanide or ammonium sulpho-cyanide iron tartrate and ammonium bi-tartrate are also used.

All these substances are mixed with the mash either before the fermentation sets in or during the process of fermentation.

For the preparation of the mash any substance used in alcoholic fermentation may be employed.

The following red colouring matters can be developed in a saccharine or glucosic solution all of which are soluble in alcohol acidulated with tartaric acid.

1. Colouring matters obtained by means of the fermentation of sugar, where orcein ($C_7 H_7 NO_3$), potassium sulpho-cyanide nitre, tartaric acid, ammonium bi-tartrate and iron tartrate are used.

For each 1000 gr: of sugar 4.49 gr: of orcein 15 gr: of nitre 7.27 gr: of potassium sulpho-cyanide 0.3 gr: of iron tartrate 25 gr: of ammonium bi-tartrate and 7.5 gr of tartaric acid are employed.

2. Colouring matters obtained by means of the fermentation of sugar, where resorcine, orcein ($C_7 H_7 NO_3$), potassium sulphocyanide, nitre, tartaric acid ammonium bitartrate and iron tartrate are employed.

[*Price 4d.*]

For each 1000 gr: of sugar 2.55 gr: of resorcine 11.49 gr: of orcein 15 gr: of nitre 7.27 gr: of potassium sulphocyanide 25 gr: of ammonium bi-tartrate 0.3 gr of iron tartrate 7.5 gr: of tartaric acid are employed.

3. Colouring matters obtained by means of the fermentation of sugar where trinitroresorcine, orcein ($C_7 H_7 NO_3$), potassium sulpho-cyanide, nitre tartaric acid, ammonium bi-tartrate and iron tartrate are used.

For each 1000 gr: of sugar 5.25 gr: of trinitroresorcine 9.83 gr: of orcein 6.23 gr: of potassium sulpho-cyanide 15 gr: of nitre 2.5 gr: of tartaric acid 25 gr: of ammonium bi-tartrate and 6 gr: of iron tartrate are employed.

The orcein ($C_7 H_7 NO_3$) in the figures 1. 2. 3 may be substituted for a part or for the whole quantity either by quercetine ($C_{24} H_{16} O_{11}$), moritannic acid ($C_{13} H_{10} O_6$), aniline, monoamidophenole and orthoamidophenole, in that manner as to have: for each 11.49 gr: of orcein with 7.27 gr of potassium sulpho-cyanide and with 15 gr: of nitre either 24 gr: of quercetine with 14.55 gr: of potassium sulpho-cyanide and with 15 gr: of nitre, or 17.85 gr: of moritannic acid with 14.55 gr: of potassium sulpho-cyanide and with 15 gr: of nitre, or 6.97 gr: of aniline with 7.27 gr: of potassium sulpho-cyanide and with 15 gr: of nitre or 8.17 gr: of monoamidophenole with 7.27 gr: of potassium sulpho-cyanide and with 15 gr: of nitre or 20.85 gr: of orthomononitrophenole and with 14.55 gr: of potassium sulpho-cyanide.

I have still to observe that I use in the figures 2 and 3 for each 7.27 gr: of potassium sulpho-cyanide 2.13 gr. of Resorcine or 6.12 gr: of Trinitroresorcine.

Of these substances, employed in the manner indicated above, nitre and nitrates, potassium sulpho-cyanide ammonium bi-tartrate and tartaric acid are to be added before the ferment, resorcine, trinitroresorcine in a state of solution before $\frac{1}{4}$th of the sugar have been fermented, moritannic acid and quercetine in a state of solution before $\frac{2}{4}$th of sugar have been fermented; orcein, aniline and monoamidophenole before $\frac{3}{4}$th of the sugar have fermented. Aniline and monoamidophenole are used in the form of bi-tartrates.

To obtain combinations of these colouring matters each of these solutions can be first produced separately and afterwards they may be mixed in a certain proportion; in this case however it would require 3 to 4 months for the combinations to take place.

It is better to mix the fermenting liquids at the moment when orcein has to be added before $\frac{3}{4}$th of the sugar has been converted into alcohol and if possible to exclude the air.

The given quantities of orcein and of quercetine are minimum quantities for the given proportions of nitre and nitrified principles. They have to be increased to an analogous proportion if extract of archil and extract of the wood of Morus tinctoria or of Rhus continus (both yellow dye woods) or the like is employed. By orthomononitrophenole I mean that one which is distilled over by steam.

The figures given for nitre and nitrified principles indicate the maximum quantities to be used for pure saccharine solutions. If matters containing albumen (nitrogenous matter) are present in the mash double the quantities of the substances specified can be employed. In this case however the ammonium bitartrate is omitted and the nitre advantageously replaced by the proportionate quantities of nitric acid.

The mash with the nitric acid, the nitre and tartaric acid are to be boiled together with 0.05 gr: of iron for every 1000 gr: of glucose and 100 gr: of nitrogenous matter during an interval of 20 to 30 minutes and it is best for this purpose to boil them by steam in a wooden vat.—The other substances are added after the cooling of the mash, after which the process proceeds exactly in the same way as in the case of pure saccharine solutions.

Here it must be taken into consideration that water is employed to such an amount with the sugar and the glucose as to obtain 5 per cent of alcoholic solution.—With the yeast derived from this process which has taken up a great quantity of coloring matter 10 to 17 per cent of alcoholic solution can be produced and in this way the whole quantity of colouring matter is obtained in alcoholic solution.—The presence of iron influences the color only in the case of substances, like catechine being employed. The presence of iron is always advantageous as it facilitates the exchange of the atoms of nitrogen.

The employment of iron with nitric acid facilitates the oxydation of the sulphur of the albuminates; by this means I obtain substituted catechines amongst which a vanilla like substance in a vegetable mash, mixed with orthomononitrophenole and moritannic acid or with quercetine—With monoamidophenole and aniline salicylic aldehyde and benzylie aldehyde as well as their methyl compounds are obtained by this method.

In pure saccharine solutions the same result can be arrived at by using potassium sulpho-cyanide and methylamine.—I therefore use also for each 1,000,000 gr: of sugar 9 gr: of methylamine bitartrate or 10 gr of trimethylamine in statt of 8 gr: ammonium bi-tartrate in the figures 1. 2 and 3 or in the substituted ones as set forth.

It is to be noted that chlorates can partly replace the nitre, although their use is not advisable.

In this process the preparation of the mash and the fermentation is carried out exactly in the same way as is usually the case in preparing alcohol, wine or beer; but it must be understood it is better to use clear mashes without draff, and a frequent drawing off and a final mechanical or chemical clarifying is necessary to obtain a clear solution.

The alcoholic solutions of colouring matters and aldehyde-like aromatic bodies obtained by these processes can be used for coloring purposes as well as for the preparation of liquors, as white, red wines or sparkling wines from which vinagre can be obtained or also by distilling the alcohol a spirit can be produced containing aldehyde like aromatic bodies.

Having now particularly described and ascertained the nature of my said Invention and in what manner the same is to be performed I declare that what I claim is:—

The process substantially as described in the specification of employing nitric acid trinitroresorcin, orthomononitrophenol with sulpho-cyanic acid, resorcin, orcein, aniline, orthomonoamidophenol, phloroglucine and catechine derivatives in a mixture in a state of alcoholic fermentation by which improvements in the fabrication of alcohol wine beer and the like are achieved.

Dated this 7th day of June 1884.

S. H. LODER.

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